1988 Rivers Inlet Echo Sounding Program Summary Report

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ABSTRACT

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Sockeye salmon escapement past the Rivers Inlet (Department of Fisheries and Oceans, Statistical Area 9) commercial fishery is monitored by an echo sounding program conducted at the head of the inlet. This report summarizes the field data collected during the 1988 Rivers Inlet echo sounding program.

RESUME

Thomson, B.L. 1988. 1988 Rivers Inlet echo sounding program: summary report. Can. Data Rep. Fish. Aquat. Sci. # 714 + 20 p. + Appendix

La peche commerciale du saumon sockeye qui remonte le bras de mer Rivers (ministere des Peches et des Oceans, secteur statistique no 9) est controlee au moyen d'un systeme d'echo-sondage mis en place a l'extremite du bras de mer. Ce rapport recapitule les donnees fournies par le programme d'echo-sondage du bras de mer Rivers durant 1988.

INTRODUCTION

An in-season echo sounding program is operated each year in Rivers Inlet (Canadian Department of Fisheries and Oceans, Statistical Area 9) to assess the sockeye salmon escapement past the commercial fishery (Figure 1). The program is conducted nightly along a fixed pattern of transects at the head of the inlet (Figure 2). Results from the program are used along with weekly catch and effort data to assist in the in-season planning of the Rivers Inlet commmercial salmon fishery.

METHODS

1988 Rivers Inlet Echo Sounding Program

The 1988 Rivers Inlet echo sounding program ran from the nights of July 6 to July 27, 1988. For the third year running, the sounding vessel the Walker Rock was equipped with a Simrad EY-M dry-paper sounder. Soundings were conducted from dusk to dawn along the Miss Robyn and RD 102 grid patterns (Table 1).

The tidal pattern for the month of July is depicted in Figure 3 (Appendix I). Throughout most of the month, the tidal heights were moderate. Extreme high water and low water were not observed until the month end.

The movement of fish through the inlet appeared to be affected by the moderate tidal changes. Fish were first observed in the sanctuary grid area (in large numbers) on July 13. A large body of fish was at this time located in sub-area 9-5 adjacent to the sounded areas. The fish continued to occupy the lower grid area and the mid to upper reaches of 9-5 for the next 2 weeks. No significant number of fish were seen in the upper grid region before the last week of July. The echo sounding program ended on the night of July 27th with an estimate of 963007 fish in the Miss Robyn Grid. The fish continued to hold between the two grid areas for the next week. Movement of fish up the Wannock River was not recorded until August .

A test IFF seine fishery was held on July 22, 1988. Two sets were made between McAllister Point and Shotbolt Bay for a total catch of 4000 sockeye and 35 pink. Scale results for the two weeks of commercial fishing prior to this indicated an sockeye age composition of 14% age 4_2, 80% age 5_2 and 4% age 6_3 fish.

A charter payment seine fishery was held in the second week of August. Sets were made in Moses Inlet, at Wadhams and at the head of the inlet. No fish were caught in the Moses Inlet set. Four sets were made at Wadhams netted approximately 5000 lbs. of pink salmon

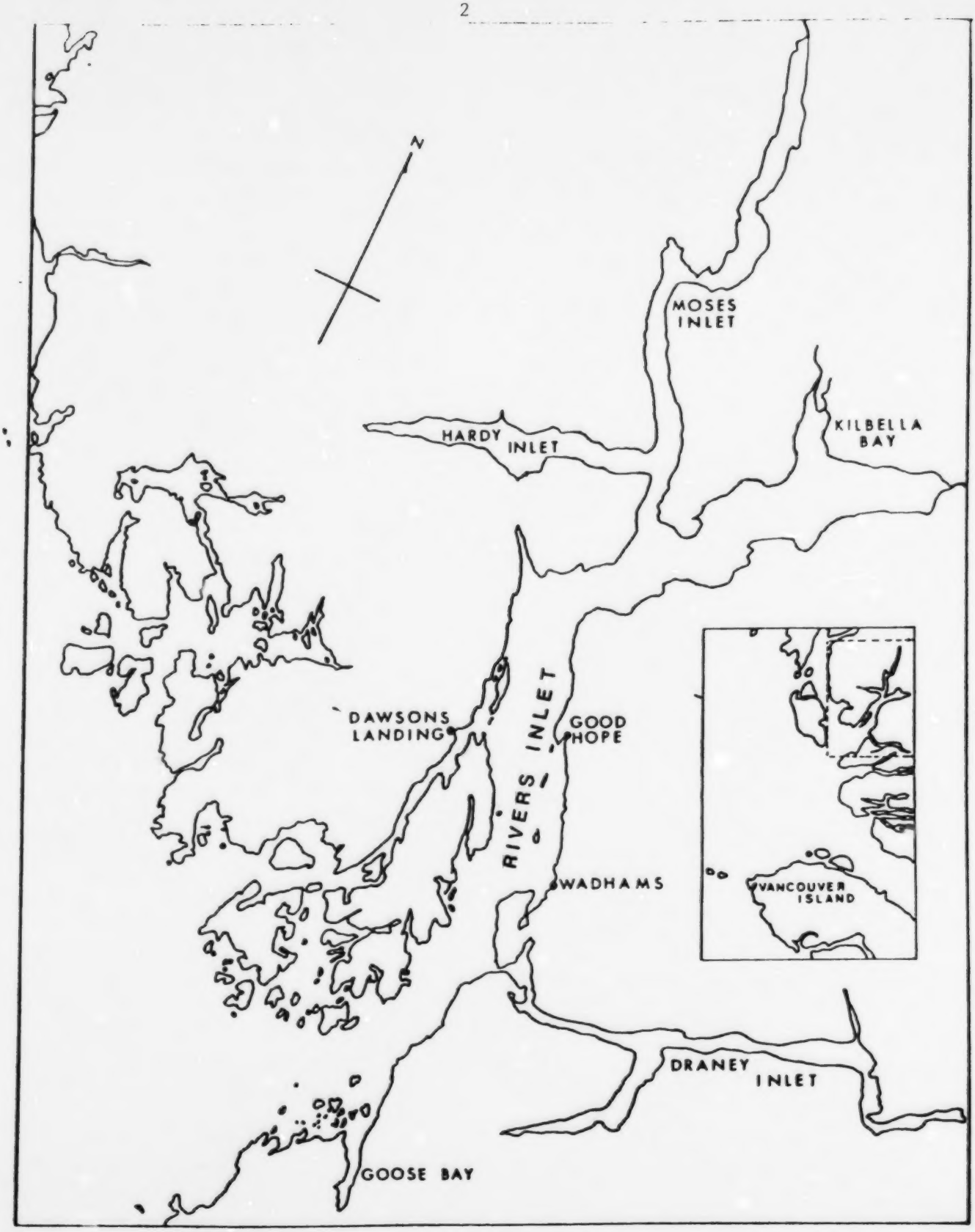


FIGURE 1. Rivers Inlet (Statistical Area 9), B.C.

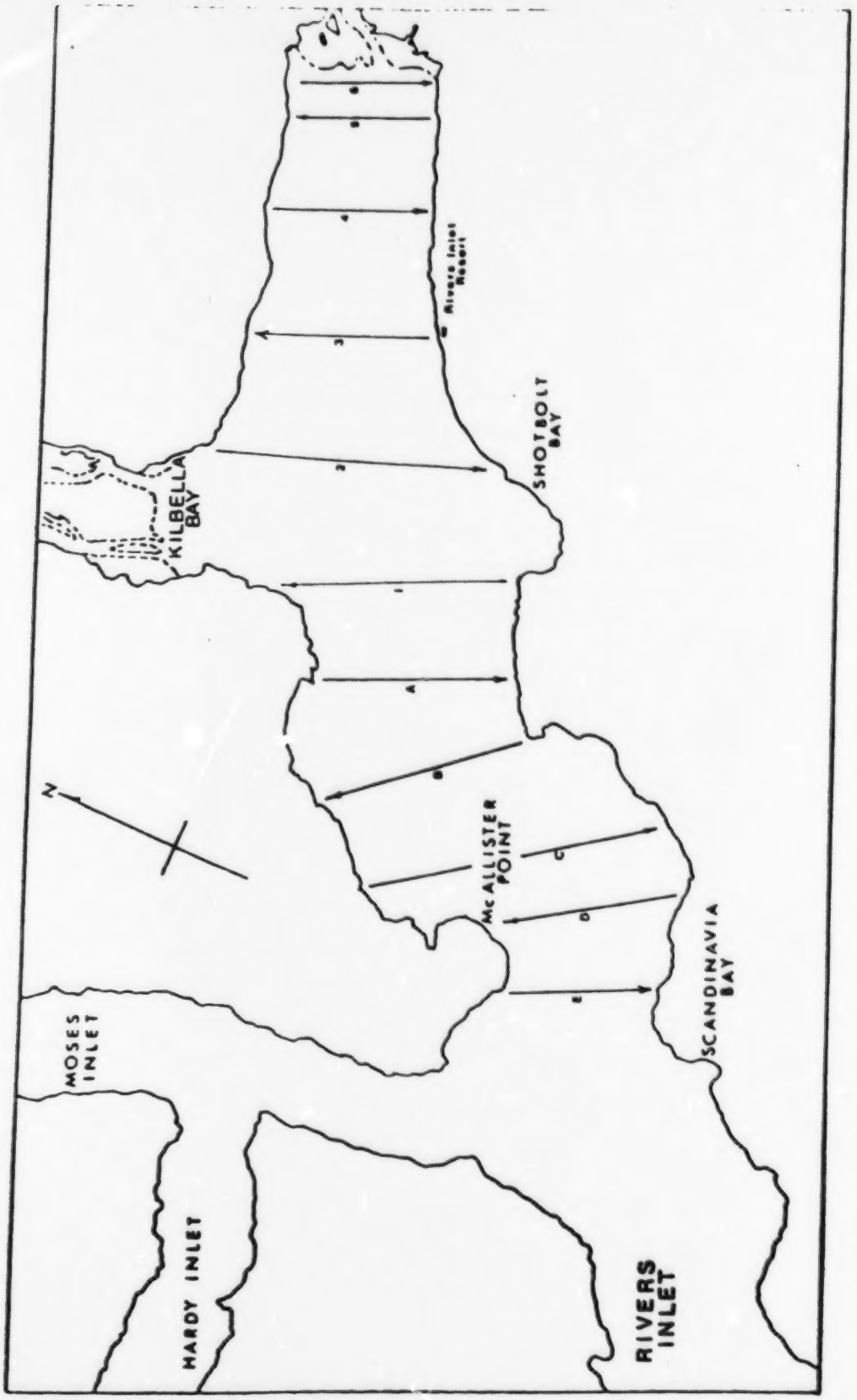


FIGURE 2. Miss Robyn Grid and R.D. 102 Grid, Rivers Inlet.

TABLE 1. 1988 Echo Sounding Results.

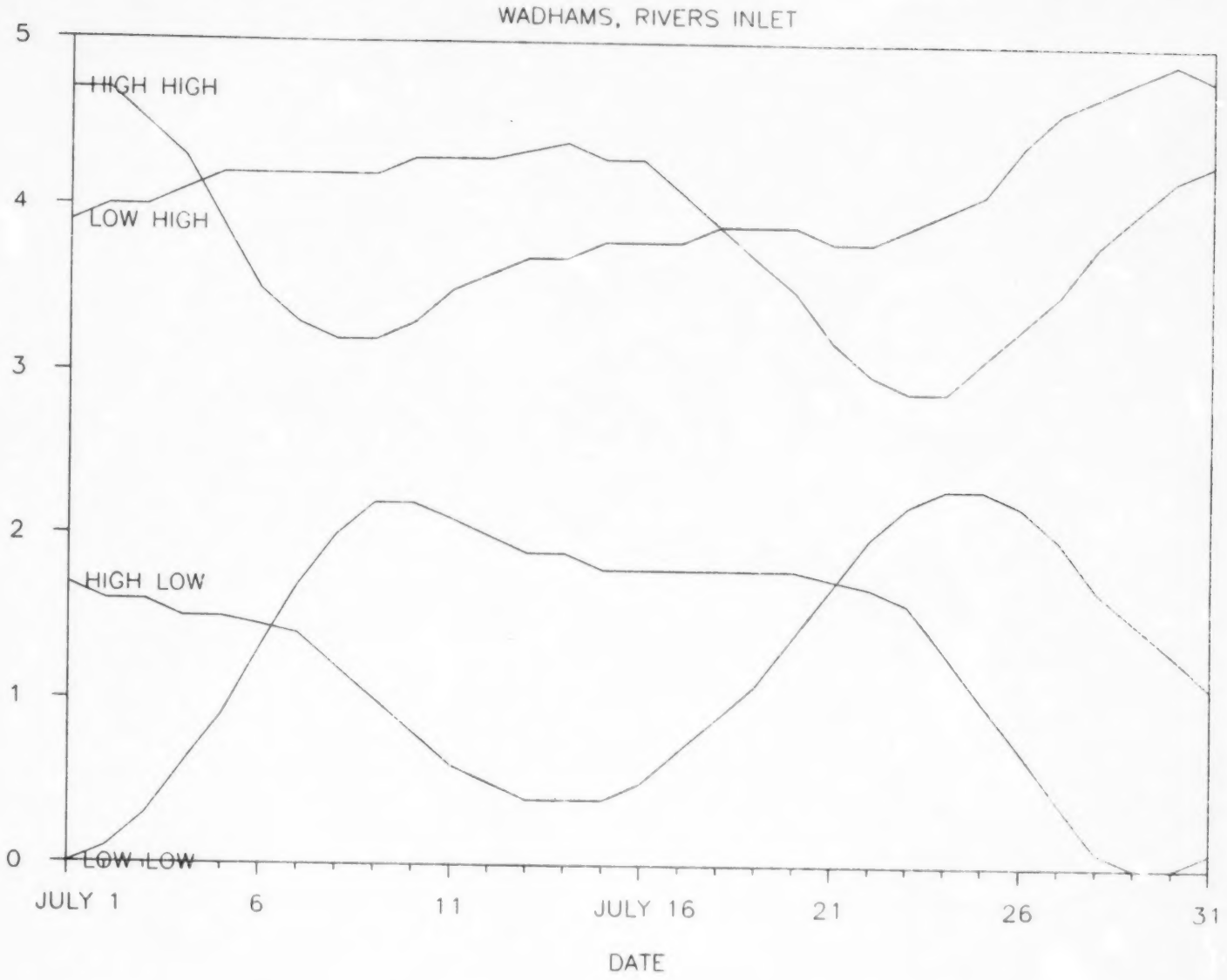
DATE	MISS ROBYN GRID 6	5	4	3	2	1	TOTAL MISS ROBYN	RD 102 GRID A	B	C	D	E	TOTAL RD 102 GRID	TOTAL ALL GRIDS
JULY 6/7	60	0	0	696	1149	3496	5401	4133	2173	436	0	0	6742	12143
JULY 7/8	0	0	0	0	14909	43352	58261	1977	4319	3613	0	0	9909	68170
JULY 8/9	238	0	893	0	7096	11627	19854	3594	7822	8382	6905	1705	28408	48262
JULY 9/10	42	334	0	205	203	0	784	1797	3208	3613	690	100	9408	10192
JULY 10/11	0	0	0	0	0	206	206	899	0	1573	0	341	2813	3019
JULY 11/12	0	0	0	0	1149	206	1355	0	0	128	690	2247	3065	4420
JULY 12/13	89	0	158	0	0	206	453	0	0	128	259	15987	16374	16827
JULY 13/14	238	0	0	1161	0	0	1399	0	2011	138776	49166	62424	252377	253776
JULY 14/15*	0	0	0	0	203	2070	2273	11682	15182	98352	22959	9095	157270	159543
JULY 15/16*	0	0	0	0	0	0	0	0	1686	17597	26963	16343	62589	62589
JULY 16/17*	60	98	0	0	0	0	158	0	0	255	6336	18262	24853	25011
JULY 17/18*	0	0	0	0	0	0	0	0	0	255	1105	6253	7613	7613
JULY 18/19*	0	0	0	0	0	0	0	1236	4103	7804	17849	21204	52196	52196
JULY 19/20*	131	0	0	2322	0	13518	15971	24082	43917	76869	69949	52808	267625	283596
JULY 20/21	143	0	0	696	38605	97719	137163	92288	125941	116976	111833	71884	518922	656085
JULY 21/22	89	209	224	726	58770	64187	124205	80584	278764	285051	123431	56817	824647	948852
JULY 22/23*	185	0	158	1161	51702	102035	155241	48122	124609	259767	113679	78887	625064	780305
JULY 23/24*	179	0	0	0	0	20774	20953	19434	39708	155835	115174	82820	412971	433924
JULY 24/25	0	0	158	1366	0	1865	3389	4090	26290	245656	135288	69084	480408	483797
JULY 25/26	262	1379	1565	29485	209972	78698	321361	99185	206448	272526	44542	8828	631529	952890
JULY 26/27	768	3329	27333	303590	201194	168694	704908	66034	86697	50136	2126	3653	208646	913554
JULY 27/28**	364	5878	71640	427534	412513	45078	963007							

NB. #'S MAY DIFFER SLIGHTLY FROM FIELD SHEET TOTALS DUE TO ROUNDING ERRORS

*FISH MILLING IN SUBAREA 9-5 OUTSIDE OF TRANSECTED AREAS

**JULY 27/28 MULTIPLE TARGETS DIFFICULT TO DISTINGUISH ON TRANSECTS #3-4.
RD 102 OPEN TO FISHING, NO SOUNDING IN GRID.

FIGURE 3. 1988 TIDE HEIGHTS (M)



(approximately 1700 pink). Scattered schools of pink salmon (20-25,000 fish/school) were spotted in the area. The pink salmon caught at Wadhams were mostly dark in colour. On August 11, four sets were made at the head of the inlet. Weather conditions were poor with strong winds interfering with the fishing. No fish were recorded on the boats sounder below Shotbolt Bay. Above Shotbolt, jumpers were seen on the flats. The four sets caught the following:

Set 1	650 sockeye
Set 2	120 sockeye (incomplete set)
Set 3	1000 sockeye, 21 chinook (released)
Set 4	10-20,000 sockeye (approx. 2000 kept)

The last set was made on 5 jumpers and netted approximately 10-20,000 sockeye. The boat crew estimated 200,000 fish still at the head, of which 99% were estimated to be sockeye. The majority of the fish were reported to still be bright in colour. The recorded sales slips for this payment fishery was 3671-3-1746-8-6 (sockeye-coho-pink-chum-chinook) pieces.

Sockeye were first reported to move up the Wannock River on August 2, 1988. Reports indicated that fish backed out of the river once more before beginning a sporadic movement into the lake on August 3, 1988. On August 11, the sockeye were still moving into the river from the holding area at the head of the inlet.

The Rivers Inlet gillnet fishery was open as follows:

Date	Subareas
July 3/4	9-2, 9-3, 9-11
July 10/11	9-2, 9-3, 9-4, 9-11
July 11/12	9-2, 9-3, 9-4, 9-11
July 17/18	9-2, 9-3, 9-11
July 24/25	9-2, 9-3, 9-4, 9-5, 9-11
July 25/26	9-2, 9-3, 9-4, 9-5, 9-11
July 26/27	9-2, 9-3, 9-4, 9-5, 9-11
July 27/28	9-2, 9-3, 9-4, 9-5, portion of 9-6, 9-11
July 28/29	9-2, 9-3, 9-4, 9-5, portion of 9-6, 9-11
July 29/30	9-2, 9-3, 9-4, 9-5, portion of 9-6, 9-11
July 30/31	9-2, 9-3, 9-4, 9-5, portion of 9-6, 9-11
July 31/Aug 1	9-2, 9-3, 9-4, 9-5, 9-11
Aug 1/2	9-2, 9-3, 9-4, 9-5, 9-11
Aug 2/3	9-2, 9-3, 9-4, 9-5, 9-11
Aug 3/4	9-2, 9-3, 9-4, 9-5, 9-11

Aug 7/8	9-2, 9-3, 9-4, 9-5, 9-7, 9-11
Aug 8/9	9-2, 9-3, 9-4, 9-5, 9-7, 9-11
Aug 14/15	9-2, 9-3, 9-4, 9-5, 9-7, 9-11
Aug 21/22	9-2, 9-3, 9-4, 9-5, 9-7, 9-11

Table 2 details the daily catches for these openings.

Observations regarding each night's sounding and the times taken to run each transect are detailed in the 'Summary of field notes'.

TABLE 2. Rivers Inlet 1988 Commercial Gillnet Catch by Day

Date		Gear Opr.	Sockeye	Coho	Pink	Chum	Chin.	Jack	Sthd
03-Jul		170	15988	677	383	651	148	147	39
	TFW	170	15988	677	383	651	148	147	39
10-Jul		469	66649	194	721	600	88	30	0
11-Jul		400	33830	225	725	511	142	71	34
	TFW	869	100479	419	1446	1111	230	101	34
	TTD	1039	116467	1096	1829	1762	378	248	73
17-Jul		446	25422	185	2957	855	70	12	11
	TFW	446	25422	185	2957	855	70	12	11
	TTD	1485	141889	1281	4786	2617	448	260	84
24-Jul		411	68579	65	14627	4892	17	9	5
25-Jul		341	24834	76	8418	2366	38	5	0
26-Jul		298	16736	50	11143	2001	9	0	0
27-Jul		219	10175	36	5300	897	17	3	0
28-Jul		152	13179	25	5002	1028	15	0	0
29-Jul		149	10556	11	4838	550	0	6	3
30-Jul		139	5733	16	5200	1182	0	0	0
	TFW*	1709	149792	1073	74993	12916	485	23	51
	TTD	3194	291681	2354	79779	15533	933	283	135
	* NOTE: COHO, PINK, CHINOOK, STEELHEAD NUMBERS BASED ON DELIVERY SLIPS, SOCKEYE AND CHUM BASED ON HAILS								
31-Jul		126	3342	58	5372	1161	12	0	2
01-Aug		94	4128	37	6139	792	14	0	0
02-Aug		95	7507	62	10395	1251	12	3	0
03-Aug		95	8612	514	16793	2991	123	8	19
	TFW	410	23589	671	38699	6195	161	11	21
	TTD	3604	315270	3025	118478	21728	1094	294	156
07-Aug		40	438	51	6449	748	11	0	0
08-Aug		34	1046	367	11373	1660	30	0	3
	TFW	74	1484	418	17822	2408	41	0	3
	TTD	3678	316754	3443	136300	24136	1135	294	159
14-Aug		24	44	138	5044	1099	6	0	1
15-Aug		23	122	212	4457	1299	61	0	0
	TFW	47	166	350	9501	2398	67	0	1
	TTD	3725	316920	3793	145801	26534	1202	294	160
21-Aug		76	49	504	2845	1325	32	0	0
	TFW	76	49	504	2845	1325	32	0	0
	TTD	3801	316969	4297	148646	27859	1234	294	160

SUMMARY OF FIELD NOTES:

A diary of the time at which each transect was run has been recorded in the event that soundings need to be correlated to tides. The exact time (minutes:seconds) taken to run each transect was measured by stopwatch. The exact times were used in the calculations to determine fish density in the transected areas.

The Department of Fisheries and Oceans MV Walker Rock was operated by Captain Thomas Robert (Bob) Alton. The echo sounding was conducted by Barbara Thomson (Biologist, Central Coast).

The Walker Rock was run at a speed of 800 RPM with the Simrad EY-M dry paper sounder set at GAIN = 9 and TVG = 40 LOG R.

July 6/7 - Depart Dawsons 9:00 pm. Arrive back 3:15 am. Weather cloudy all day. High tide 6:30 pm, low tide 1:05 am. Killer whales seen at Dawsons and subarea 9-4 on July 5.

	Times (min:sec)
Miss Robyn Grid-	
Transect #6	10:48-10:56 (7:49.36)
Transect #5	10:58-11:06 (8:46.00)
Transect #4	11:12-11:23 (11:14.48)
Transect #3	11:27-11:41 (13:56.38)
Transect #2	11:48-12:09 (21:17.45)
Transect #1	12:15-12:36 (20:53.37)
RD 102 Grid-	
Transect A	12:45-12:58 (12:47.09)
Transect B	1:02-1:16 (13:40.23)
Transect C	1:21-1:43 (21:07.99)
Transect D	1:47-2:02 (14:15.80)
Transect E	2:06-2:17 (11:12.97)

July 7/8 - Depart Dawsons 9:00 pm, arrive back 3:15 am. Weather clear all day. High tide 7:12 pm, low tide 2:18 am. No sign of fish at inlet head (B. Weber, patrolman)

Miss Robyn Grid:	
Transect #6	10:52-11:00 (8:48.43)
Transect #5	11:01-11:10 (8:54.25)
Transect #4	11:14-11:24 (10:19.61)
Transect #3	11:29-11:43 (13:06.71)
Transect #2	11:50-12:11 (21:12.32)
Transect #1	12:17-12:25 (18:30.97)

RD 102 Grid:

Transect A	12:42-12:53	(10:03.95)
Transect B	12:55-1:08	(13:40.49)
Transect C	1:13-1:34	(20:58.33)
Transect D	1:39-1:42	(11:59.42)
Transect E	2:10-2:20	(10:00.11)

July 8/9 - Depart Dawsons 9:10 pm, arrive back 3:35 am. Light cloud all day. Chilko Post reported jumpers between Brown's Bay and Stone Point. Numerous targets seen between Transect E and Marine Passage (N. Darby Channel) on the return trip (on ebb tide).

Miss Robyn Grid:

Transect #6	10:50-11:00	(9:30.22)
Transect #5	11:01-11:10	(8:26.74)
Transect #4	11:15-11:25	(10:40.59)
Transect #3	11:29-11:42	(12:56.16)
Transect #2	11:49-12:12	(22:58.97)
Transect #1	12:19-12:42	(22:35.40)

RD 102 Grid:

Transect A	12:59-1:11	(12:40.39)
Transect B	1:17-1:31	(13:58.89)
Transect C	1:38-2:04	(25:38.67)
Transect D	2:10-2:24	(13:36.56)
Transect E	2:29-2:38	(9:13.02)

July 9/10 - Depart Dawsons 9:00 pm, arrive back 3:30 am. Light cloud all day. High tide 9:00 pm, low tide 4:00 am. Pod of Killer Whales in Inlet, travelled up to head of inlet at 4 pm. Targets apparent from end of transects to Dawsons on return trip.

Miss Robyn Grid:

Transect #6	10:37-10:46	(8:47.40)
Transect #5	10:48-10:58	(9:22.73)
Transect #4	11:00-11:10	(9:48.92)
Transect #3	11:17-11:31	(13:46.61)
Transect #2	11:41-12:01	(20:36.83)
Transect #1	12:07-12:28	(20:41.89)

RD 102 Grid:

Transect A	12:36-12:49	(12:55.28)
Transect B	12:53-1:07	(13:26.44)
Transect C	1:12-1:34	(21:45.99)
Transect D	1:38-1:52	(13:23.00)
Transect E	1:56-2:07	(11:01.75)

July 10-11 - Depart Dawsons 8:50 pm, arrive back 4:10 am. First night of 2 day fishery (open to subarea 9-4). Cloudy, overcast all day, some light drizzle. High tide 10 pm, low tide 5 am.

Miss Robyn Grid:

Transect #6	10:43-10:53	(9:27.55)
Transect #5	10:54-11:05	(10:54.08)
Transect #4	11:08-11:18	(10:19.27)
Transect #3	11:25-11:39	(13:40.49)
Transect #2	11:47-12:12	(24:44.11)
Transect #1	12:20-12:43	(22:37.56)

RD 102 Grid:

Transect A	12:52-1:06	(13:50.72)
Transect B	1:09-1:24	(15:04.57)
Transect C	1:30-1:54	(23:43.71)
Transect D	2:00-2:16	(15:14.19)
Transect E	2:20-2:31	(10:47.71)

July 11/12 - Depart Dawsons 9:00 pm, arrive back 3:30 am. Cloudy, some rain. Second day of fishery- large catches at boundary last night. High tide 11 pm, low tide 6 am.

Miss Robyn Grid:

Transect #6	10:48-10:56	(8:28.44)
Transect #5	10:58-11:07	(9:19.96)
Transect #4	11:10-11:20	(10:04.71)
Transect #3	11:26-11:40	(13:32.97)
Transect #2	11:47-12:07	(20:30.38)
Transect #1	12:14-12:34	(20:22.02)

RD 102 Grid:

Transect A	12:44-12:57 (12:27.38)
Transect B	1:00-1:12 (12:12.02)
Transect C	1:22-1:43 (21:31.70)
Transect D	1:50-2:04 (13:44.65)
Transect E	2:08-2:20 (11:21.98)

Targets recorded below counted depths in outer transects.

July 12/13 - Depart Dawsons 9:00 pm, arrive back 3:30 am. Rain all day. Fishery closed at 6 pm. High tide 12 pm, low tide 6 am. Targets showing in RD 102 Grid on colour sounder on way to inlet head. On return trip, excellent showing of fish from the end of Transect E to Stone Pt (> 250 targets) in upper 5 fathoms (slack tide).

Miss Robyn Grid:

Transect #6	10:44-10:52 (8:20.65)
Transect #5	10:53-11:03 (9:56.30)
Transect #4	11:09-11:28 (10:24.39)
Transect #3	11:25-11:39 (13:31.89)
Transect #2	11:46-12:07 (20:22.26)
Transect #1	12:13-12:33 (19:31.68)

RD 102 Grid:

Transect A	12:41-12:54 (13:31.36)
Transect B	12:59-1:13 (14:45.09)
Transect C	1:22-1:44 (21:16.74)
Transect D	1:50-2:04 (13:41.90)
Transect E	2:10-2:21 (11:02.34)
Transect to Stone Pt.	2:21-2:49

July 13/14 - Depart Dawsons 9:00 pm, arrive back 3:30 am. Heavy rain throughout the day. High tide peaking tonight at 12:20 am (4.4 metres), low at 8 am. Large numbers of targets between Transects D & E. Targets seen on colour sounder below Stone Pt on return trip.

Miss Robyn Grid:

Transect #6	10:35-10:44 (9:27.08)
Transect #5	10:45-10:55 (9:47.99)
Transect #4	11:01-11:12 (11:11.57)
Transect #3	11:20-11:33 (12:57.06)
Transect #2	11:43-12:04 (21:21.88)
Transect #1	12:10-12:32 (20:54.71)

RD 102 Grid:

Transect A	12:45-12:59	(13:59.96)
Transect B	1:03-1:17	(14:29.76)
Transect C	1:27-1:40	(22:09.66)
Transect D	1:57-2:12	(15:04.52)
Transect E	2:19-2:30	(10:57.51)

July 14/15 - Depart Dawsons 8:00 pm, arrive back 3:40 am. Jumpers off McPhee Bay (low slack) on way up inlet. Bob Bachen reported sockeye jumpers around mouth of Moses Inlet in evening. High tide 00:57 am, low tide 7:53 am. Targets between Transects B, C and D.

Miss Robyn Grid:

Transect #6	10:34-10:43	(9:18.36)
Transect #5	10:45-10:55	(9:46.76)
Transect #4	11:01-11:12	(11:57.62)
Transect #3	11:19-11:33	(13:53.91)
Transect #2	11:45-12:06	(21:00.76)
Transect #1	12:12-12:32	(19:35.13)

RD 102 Grid:

Transect A	12:43-12:56	(12:40.53)
Transect B	1:02-1:15	(12:48.58)
Transect C	1:25-1:46	(21:44.14)
Transect D	1:53-2:07	(13:40.76)
Transect E	2:14-2:25	(11:31.20)

July 15/16 - Depart Dawsons 8:00 pm, arrive back 3:50 pm. Sun and cloud, westerly. Low tide 8 pm, high tide 1:30 am, low tide 8:30 am. On the return trip, approximately 300 targets were recorded between Transect E and Stone Pt. In the Miss Robyn Grid, each transect had a few targets at depths greater than 10 fathoms.

Miss Robyn Grid:

Transect #6	10:42-10:51	(8:52.81)
Transect #5	10:52-11:00	(9:06.88)
Transect #4	11:07-11:17	(10:34.33)
Transect #3	11:24-11:38	(13:15.52)
Transect #2	11:47-12:05	(19:00.52)
Transect #1	12:13-12:33	(20:24.84)

RD 102 Grid:

Transect A	12:46-12:59	(12:57.39)
Transect B	1:03-1:17	(13:32.88)
Transect C	1:27-1:47	(21:04.22)
Transect D	1:56-2:08	(13:14.56)
Transect E	2:16-2:27	(10:52.11)

July 16/17 - Depart 8:30 pm, arrive back 3:50 am. Clear with some cloud. Pinks reported at inlet mouth, jumpers around Good Hope Cannery. Low tide 6:30 pm, high tide 2:15 am, low tide 9 am. Few targets were observed in the grid areas, 90% of the targets were seen between Transect E and Stone Pt.

Miss Robyn Grid:

Transect #6	10:38-10:48	(9:06.94)
Transect #5	10:49-10:58	(9:42.58)
Transect #4	11:04-11:15	(11:15.30)
Transect #3	11:23-11:37	(14:09.46)
Transect #2	11:47-12:08	(20:53.90)
Transect #1	12:14-12:36	(21:25.26)

RD 102 Grid:

Transect A	12:48-1:02	(13:46.18)
Transect B	1:06-1:20	(13:39.77)
Transect C	1:30-1:52	(22:11.09)
Transect D	1:59-2:13	(14:10.96)
Transect E	2:22-2:34	(11:28.93)

July 17/18 - Depart Dawsons 8:20 pm, arrive back 3:35 am. Hot and sunny all day. Low tide 9 pm, high tide 3 am. Very few targets in grid areas, 95% of the targets between Transect E and Stone Pt. One day fishery (up to subarea 9-4) open 6 pm.

Miss Robyn Grid:

Transect #6	10:38-10:47	(8:57.72)
Transect #5	10:48-10:57	(9:32.91)
Transect #4	11:03-11:15	(12:06.22)
Transect #3	11:22-11:36	(13:47.19)
Transect #2	11:47-12:08	(21:34.63)
Transect #1	12:14-12:35	(21:01.56)

RD 102 Grid:

Transect A	12:48-1:00	(12:12.92)
Transect B	1:04-1:16	(12:37.70)
Transect C	1:25-1:46	(20:53.52)
Transect D	1:53-2:07	(13:42.40)
Transect E	2:14-2:25	(10:00.00)

July 18/19 - Depart Dawsons 9:00 pm, arrive back 3:20 am. Sunny all day, westerly. Signs of jumpers, schools below Moses Inlet, small schools on colour sounder below McAllister Pt. Low tide 9 pm, high tide 3:30 am. More than 90% of targets are still in subarea 9-5 on return run (Transect E to Stone Pt). Estimated count in transected area 52196.

Miss Robyn Grid:

Transect #6	10:57-11:04	(8:08.94)
Transect #5	11:06-11:14	(9:02.09)
Transect #4	11:20-11:30	(10:40.53)
Transect #3	11:37-11:50	(13:14.00)
Transect #2	12:00-12:20	(20:35.21)
Transect #1	12:25-12:45	(19:02.82)

RD 102 Grid:

Transect A	12:55-1:07	(12:32.49)
Transect B	1:10-1:22	(12:27.75)
Transect C	1:29-1:51	(21:13.23)
Transect D	1:57-2:11	(14:17.06)
Transect E	2:17-2:28	(10:18.32)

July 19/20 - Depart Dawsons 9:00 pm, arrive back 3:30 am. Sunny and hot all day. Low tide 10:30 pm, high tide 4:12 am. Good showing in RD 102 Grid, large number of targets in subarea 9-5 to Scandanavia Bay. Estimated count in transected area 283596.

Miss Robyn Grid:

Transect #6	10:46-10:55	(8:49.47)
Transect #5	10:57-11:06	(9:17.67)
Transect #4	11:11-11:23	(11:27.96)
Transect #3	11:30-11:43	(13:42.41)
Transect #2	11:53-12:13	(19:33.42)
Transect #1	12:18-12:38	(19:54.46)

RD 102 Grid:

Transect A	12:50-1:04	(13:43.30)
Transect B	1:07-1:20	(13:06.63)
Transect C	1:28-1:49	(20:57.96)
Transect D	1:58-2:11	(13.20.41)
Transect E	2:18-2:31	(11:54.73)

July 20/21 - Depart 9:00 pm, arrive back 4:00 am. Sun all day, evening cloud, westerlies. Low tide 11:30 pm, high tide 5 am. Large number of jumpers towards head of inlet, number of targets on colour sounder. This is the first night of definate signs of fish in the sanctuary area. Good showing in lower Miss Robyn Grid and throughout RD 102 Grid. Number of targets still present to Scandanavia Bay area (upper 9-5). Estimated count in transected area 656085.

Miss Robyn Grid:

Transect #6	10:45-10:54	(9:42.35)
Transect #5	10:56-11:06	(10:16.11)
Transect #4	11:13-11:25	(11:40.30)
Transect #3	11:34-11:48	(14:28.83)
Transect #2	11:59-12:20	(20:30.02)
Transect #1	12:28-12:52	(22:39.81)

RD 102 Grid:

Transect A	1:05-1:18	(14:07.58)
Transect B	1:23-1:38	(14:37.70)
Transect C	1:46-2:08	(22:34.07)
Transect D	2:15-2:30	(15:08.59)
Transect E	2:39-2:51	(11:59.67)

July 21/22 - Depart Dawsons 9:00 pm, arrive back 3:30 am. Cloudy all day. Pinks reported jumping at Dawsons. Brian Lunn reported fish up to river mouth (helicopter overflight). Low tide 00:30 am, high tide 6 am. Estimated count for tonight-948852 fish (primarily in RD 102 Grid). At top end of RD 102, targets primarily on south side of inlet. On Transect B, targets distributed across inlet. In outer transects, large number of targets at depths greater than 10 fathoms.

Miss Robyn Grid:

Transect #6	10:54-11:03	(8:09.00)
Transect #5	11:04-11:12	(8:59.27)
Transect #4	11:18-11:28	(10:48.10)
Transect #3	11:36-11:48	(12:35.07)
Transect #2	11:57-12:15	(18:49.90)
Transect #1	12:21-12:42	(19:22.43)

RD 102 Grid:

Transect A	12:53-1:04	(12:10.25)
Transect B	1:07-1:20	(12:39.12)
Transect C	1:28-1:47	(19:14.82)
Transect D	1:54-2:07	(12:55.92)
Transect E	2:12-2:22	(10:10.04)

July 22/23 - Depart Dawsons 9:00 pm, arrive back 3:30 am. Sunny and hot all day. Bella Bella IFF Seine catch (2 sets) approx. 4000 sockeye and 35 pinks (RD 102 Grid area). High tide 6:30 pm, low tide 1:30 am. Estimate down slightly tonight (780305), but number of targets still at top end of 9-5 (out of transected area). Targets primarily on south side of inlet in transects around Shotbolt Bay. Transect B- targets distributed across inlet, lower end of RD 102- less targets on south side of inlet.

Miss Robyn Grid:

Transect #6	10:47-10:55	(8:47.97)
Transect #5	10:57-11:06	(9:23.49)
Transect #4	11:12-11:23	(11:15.31)
Transect #3	11:30-11:44	(13:41.39)
Transect #2	11:53-12:11	(18:22.74)
Transect #1	12:18-12:39	(20:36.56)

RD 102 Grid:

Transect A	12:50-1:03	(12:43:70)
Transect B	1:06-1:19	(13:14.59)
Transect C	1:37-1:58	(20:52.09)
Transect D	2:05-2:18	(13:51.07)
Transect E	2:24-2:34	(9:48.03)

July 23/24 - Depart Dawsons 9:00 pm, arrive back 4:15 am. Cloudy all day, some rain. Schools showing on colour sounder around McAllister Pt. High tide 7:20 pm, low tide 2:40 am, high tide 9 am. Poor showing in Miss Robyn Grid- very few fish at depths greater than 10 fathoms. Fish further out than last

few nights (estimate 433923 in transected area). Targets seen in upper RD 102 transects on south shore. Targets distributed across inlet in Transect C.

Miss Robyn Grid:

Transect #6	10:50-11:00	(9:39.30)
Transect #5	11:01-11:10	(10:02.87)
Transect #4	11:16-11:27	(11:19.30)
Transect #3	11:35-11:48	(13:32.97)
Transect #2	11:58-12:17	(20:30.67)
Transect #1	12:25-12:46	(21:28.54)

RD 102 Grid:

Transect A	12:57-1:09	(12:37.12)
Transect B	1:12-1:27	(14:16.98)
Transect C	1:36-1:58	(21:20.49)
Transect D	2:04-2:17	(12:59.23)
Transect E	2:22-2:33	(10:28.76)

Extra Transects : three additional transects were run in subarea 9-5. The transects were each separated by a 5 minute run down the shoreline (at 800 RPM). Because no equations have been developed to estimate fish numbers on transects outside of the sanctuary area, rough estimates were made by comparing the additional transect lengths (as measured in time) to known transects (run in the same direction). It was estimated that approximately 300,000 fish were present in this area.

S. shore to Moses Inlet	(13:39.09)
N. shore to Scandanavia Bay	(13:40.15)
Stone Pt. to headland N. shore	(10:30.77)

July 24/25 - Depart Brown's Bay 8:30 pm, arrive back 3:30 am. First night of fishery (inlet open to subarea 9-5). Heavy rain throughout day, strong winds. High tide 8:17 pm, low tide 3:48 am. Transect E slightly skewed due to interference from fishery. Most of targets in RD 102 Grid.

Miss Robyn Grid:

Transect #6	10:29-10:38	(9:16.56)
Transect #5	10:39-10:51	(11:36.97)
Transect #4	10:58-11:10	(12:27.42)
Transect #3	11:16-11:32	(15:41.32)
Transect #2	11:45-12:05	(19:59.33)
Transect #1	12:13-12:37	(24:20.18)

RD 102 Grid:

Transect A	12:50-1:03	(13:44.26)
Transect B	1:06-1:21	(15:13.42)
Transect C	1:30-1:55	(25:10.18)
Transect D	2:04-2:20	(16:04.39)
Transect E	2:24-2:36	(11:08.53)

July 25/26 - Depart Brown's Bay 9:30 pm, arrive back 3:30 am. Second day of fishery. Reports of fish at head of inlet. Targets on colour sounder from Brown's Bay to Rivers Lodge. High overcast all day, some wind. Heavy rain at night. High tide 9:20 pm, low tide 4:40 am. Targets in both Miss Robyn Grid and RD 102 Grid. Fish on south side of inlet in Miss Robyn Grid and top of RD 102 Grid, and on north side of inlet in lower RD 102 Grid. Final count of 952890 fish.

Miss Robyn Grid:

Transect #6	10:31-10:40	(9:15.22)
Transect #5	10:42-10:51	(9:25.29)
Transect #4	10:56-11:07	(11:13.43)
Transect #3	11:14-11:28	(14:05.74)
Transect #2	11:38-11:59	(21:03.64)
Transect #1	12:06-12:26	(21:23.51)

RD 102 Grid:

Transect A	12:37-12:50	(12:34.66)
Transect B	12:52-1:05	(13:08.03)
Transect C	1:12-1:36	(22:44.56)
Transect D	1:43-1:57	(14:33.39)
Transect E	2:02-2:12	(9:56.19)

July 26/27 - Depart Brown's Bay 9:30 pm, arrive back 3:00 am. Third day of fishery. Fishing at top boundary of 9-5 dropping off. Good catches in 9-2 today, poor catches in 9-11. High overcast. High tide 10:17 pm, low tide 5:30 am. Most of targets in Miss Robyn Grid tonight (705000), total count of 913553 fish. Fish on south side of inlet in Miss Robyn Grid, across inlet on Transect B, and on north side of inlet on Transect C.

Miss Robyn Grid:

Transect #6	10:43-10:52 (8:52.08)
Transect #5	10:53-11:02 (10:22.08)
Transect #4	11:11-11:21 (11:05.61)
Transect #3	11:30-11:43 (13:28.35)
Transect #2	11:54-12:17 (22:49.64)
Transect #1	12:25-12:46 (20:38.49)

RD 102 Grid:

Transect A	12:57-1:08 (12:54.71)
Transect B	1:12-1:26 (13:23.50)
Transect C	1:33-1:53 (19:58.96)
Transect D	2:00-2:14 (14:10.15)
Transect E	2:17-2:28 (10:34.32)

July 27/28 - Depart Brown's Bay 6:00 pm, arrive Kilbella Bay 2:30. High overcast all day. High tide 11:10 pm, low tide 6:20 am. Fourth night of fishery, boundary moved up to point of land below Shotbolt Bay (top end of RD 102 Grid). Some reports of fish at head moving up river (backed out next morning). Large schools in Miss Robyn Grid on colour sounder, number of jumpers seen throughout grid area. Targets dense in Transects #3 and #2- difficult to separate for enumeration purposes. A large number of targets were also present below 10 fathoms. Final count of 963007 in Miss Robyn Grid. No soundings were possible in RD 102 Grid due to the presence of boats.

Miss Robyn Grid:

Transect #6	10:34-10:44 (9:50.09)
Transect #5	10:45-10:56 (11:00.35)
Transect #4	11:02-11:15 (12:53.24)
Transect #3	11:23-11:38 (15:25.06)
Transect #2	11:50-12:12 (22:57.86)
Transect #1	12:20-12:42 (21:51.39)

APPENDIX I. 1988 Tide Height (M) at Wadhams, Rivers Inlet (PST).

DATE	TIME	HEIGHT (M)	DATE	TIME	HEIGHT (M)	DATE	TIME	HEIGHT (M)
JULY 1	0057	4.7	JULY 12	0603	0.5	JULY 23	0133	1.6
	0758	0.0		1227	3.6		0732	2.9
	1417	3.9		1753	2.0		1243	2.2
	1953	1.7		2337	4.3		1917	3.9
JULY 2	0147	4.7	JULY 13	0643	0.4	JULY 24	0243	1.3
	0843	0.1		1302	3.7		0902	2.9
	1502	4.0		1833	1.9		1353	2.3
	2048	1.6	JULY 14	0022	4.4		2017	4.0
JULY 3	0242	4.5		0718	0.4	JULY 25	0348	1.0
	0928	0.3		1337	3.7		1012	3.1
	1547	4.0		1908	1.9		1513	2.3
	2143	1.6	JULY 15	0057	4.3		2122	4.1
JULY 4	0332	4.3		0753	0.4	JULY 26	0443	0.7
	1008	0.6		1412	3.8		1107	3.3
	1632	4.1		1948	1.8		1618	2.2
	2243	1.5	JULY 16	0137	4.3		2217	4.4
JULY 5	0432	3.9		0828	0.5	JULY 27	0533	0.4
	1058	0.9		1447	3.8		1152	3.5
	1722	4.2		2028	1.8		1713	2.0
	2353	1.5	JULY 17	0217	4.1		2312	4.6
JULY 6	0538	3.5		0858	0.7	JULY 28	0618	0.1
	1148	1.3		1517	3.8		1237	3.8
	1812	4.2		2103	1.8		1803	1.7
JULY 7	0103	1.4	JULY 18	0252	3.9	JULY 29	0002	4.8
	0652	3.3		0923	0.9		0658	0.0
	1243	1.7		1547	3.9		1312	4.0
	1912	4.2		2148	1.8		1853	1.5
JULY 8	0218	1.2	JULY 19	0332	3.7	JULY 30	0052	4.9
	0817	3.2		0953	1.1		0738	0.0
	1343	2.0		1617	3.9		1352	4.2
	2007	4.2		2238	1.8		1943	1.3
JULY 9	0323	1.0	JULY 20	0412	3.5	JULY 31	0142	4.8
	0937	3.2		1023	1.4		0818	0.1
	1458	2.2		1652	3.9		1432	4.3
	2107	4.2		2328	1.8		2033	1.1
JULY 10	0423	0.8	JULY 21	0502	3.2			
	1052	3.3		1058	1.7			
	1603	2.2		1732	3.8			
	2202	4.3	JULY 22	0028	1.7			
JULY 11	0518	0.6		0607	3.0			
	1142	3.5		1143	2.0			
	1703	2.1		1822	3.8			
	2252	4.3						